

the result was a deficient monsoon, which, moreover, terminated three weeks earlier than usual.

A similar weakness of the trades was visible, particularly at the Seychelles, this year. Hence, though Mr. Eliot was obliged to admit that the local conditions were favourable, he added a caution that "the inferences were to be accepted with greater reserve than usual."

The arena was ready for the gladiator if he arrived in good training, but the fight would depend on his strength. As events have shown, the gladiator monsoon was not "up to form," and the fight terminated a month earlier than usual all over Northern India and Burmah, with disastrous consequences to the kharif crop. It now remains to be seen whether the coming winter rains will be in defect or excess.

Until the end of the present month, when they can be inferred from the vertical anomalies of pressure, a provisional forecast can only be made on the law of sequences.

As a rule, "a light and early departing monsoon is followed by light winter rains." Consequently, so far, the outlook is serious. In such a case, however, by a similar law of sequence, the rainfall of next year's summer monsoon should be unusually heavy, so that the famine cannot continue for more than another six months. It is to be hoped that the omen may be averted, and that other factors may override the usual sequence and allow a good winter fall, which would, at all events, shorten the period of distress, and favourably modify, although it could not obviate the effects of the mischief done in September.

It would be impossible here to do more than cursorily advert to the moot question as to how far the periods of sunspot activity are directly related to the monsoons in a form in which they can be of practical utility in forecasting. *Pace* all that has been said to the contrary, there is no doubt that the condition of the sun introduces a long-period oscillation, probably of similar eleven-year period and small amplitude, into all the elements of Indian weather, modifying the epochal dates, and partially altering the character of the summer and winter rains; but year by year such a variation is too small, and too masked by others of larger amplitude, depending on changes of flow in the atmospheric currents of a less periodical and more rapid character, to admit of its entering as anything but a subordinate factor into the seasonal forecast. The attention of the department at present is so concentrated on these larger six-monthly and two-yearly oscillations, that it is unable to devote itself to the undoubtedly important task of determining the precise local value of the sunspot variation.

That this exists, however, even dominantly over the whole area, is plain from the following grouping of the yearly rainfall anomalies of the entire Indian area from 1864 to 1894, which shows that the total annual rainfall is slightly deficient about the epoch of sunspot minimum, and slightly excessive about the opposite epoch.

Groups of years.

Rainfall of India during the south-west monsoon. Anomaly from the mean smoothed figures.

Five years round year of minimum sunspot - 0.40 in.
Five years round year of maximum sunspot + 2.10 "

The relation to the sunspots is, however, greatly modified according to locality, being especially marked during the south-west monsoon over the Carnatic and Ceylon, and occurring in a reversed phase during the winter rains of North India. Symptoms of an early arrival of the monsoon in years of maximum, and late in years of minimum, have been noted; but the general statistical examination of the question on a rational basis is still a desideratum, and one which, given the necessary additional staff, Mr. Eliot considers of sufficient importance to claim the attention of the department.

At present his view of the matter, so far as its value in practical forecasting is concerned, may be stated thus.

After all the other factors have been considered, the position of the year in the sunspot cycle may be taken as an index of the steadiness or variability of its general characteristics. Thus, in years of maximum sunspot the monsoon is distributed more evenly, and local anomalies are less exaggerated. The years about the epoch of minimum are characterised by greater local contrasts and irregularities. A comparison of anomaly ranges with sunspots would thus repay investigation, and they might yet be shown to possess a value far in excess of that indicated by the small fluctuations visible in the combined averages over dissimilar areas.

DOUGLAS ARCHIBALD.

THE NEW RESEARCH LABORATORY OF THE ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

IN 1888 the Royal College of Physicians of Edinburgh determined to establish and equip a laboratory for original research. The scheme was regarded by the College as to a certain extent experimental, and was proceeded with cautiously. Instead of erecting special premises, an old house in Lauriston Lane was rented, close to the Royal Infirmary, and this was adapted and equipped at an outlay of 1000*l*. The success of the scheme soon became assured, and a large number of workers availed themselves of the opportunities afforded by the new laboratory for conducting investigations. The chief results of their work are set forth in five volumes of Laboratory Reports, and a sixth is now in course of preparation. A very important function of the Institution, moreover, has been the issuing of reports on morbid specimens sent to the Superintendent by practitioners. This work has gradually increased. While in 1890 only fifty reports were sent out, last year no less than 417 specimens were examined and reported on. In addition to these two primary objects of the Institution, the preparation of antitoxin serums has lately been undertaken at the instruction of the College.

The original building soon proved inadequate for the growing work of the laboratory, and the College being assured that the influence of its laboratory tended to the maintenance of the scientific spirit in medicine, directed its Committee to seek for a site on which to place a permanent institution. After many failures the College succeeded in acquiring a site and premises adapted to their wants, which has been purchased and equipped at a cost of about 10,000*l*.

The new laboratory, which was opened on November 6, is situated in Forrest Road, in the immediate vicinity of the Royal Infirmary, the University, and other medical schools.

In equipping these new premises, the objects kept in view were:—

(1) To provide a research laboratory in which bacteriological, histological, and chemical and experimental physiological and pathological work might be carried on.

(2) To make provision for examining and reporting on specimens sent by medical men.

(3) To provide a photographic department for macro- and micro-photography.

(4) To make suitable provision for carrying on the preparation of curative antitoxins, &c.

The fitting-up of the laboratory is in every respect most complete. Those portions of the building intended for laboratory work are heated by hot-water pipes, and are lighted by electricity. Hot water and steam for heating water baths are supplied throughout the building from a high-pressure-boiler; and in each department the supply of gas and water can be shut off without interfering with work in the other parts of the laboratory. Communications between the various rooms is by interchangeable telephones. To the right of the entrance is a large, well-lighted apartment, which will be used as the general office of the laboratory and for the examination of specimens. Opening off this apartment are two photographic rooms, the outer of which contains the micro-photographic apparatus and an arc lamp in a lantern, while the inner is the dark-room. On the left side of the entrance hall access is obtained to the Superintendent's room and the experimental apartment, the principal room on the ground floor, which is fitted up with the most modern apparatus and appliances for the carrying on of experimental work. In the old laboratory the recording gear was driven by water-power; in the new premises this work is done by two small electric motors placed beneath the floor. On the first flat, to the left of the landing, is the chemical room and a smaller room fitted with fume chambers. Provided with a working bench with places for six workers, the general chemical room is equipped in the most modern style. A through draught for the fume chamber is secured by a small fan driven by an electric motor. On the left of the landing, again, are large and small histological rooms and several apartments forming the bacteriological department. One of these rooms will be used for the production of the media for growing germs, and the production of diphtheria antitoxin. This department includes an incubating room.

The new laboratory, like the old, is freely open to those who desire to undertake original investigations in the medical

sciences, on their giving evidence of being able to undertake such work with a good prospect of success. Applications are considered by the Committee, who recommend to the Council, and this body grants a place in the laboratory. Apparatus, chemicals, &c., are supplied by the College free of charge, while assistance is given by the Superintendent and a staff of laboratory servants.

The examination and reporting on morbid specimens was instituted primarily for the Fellows of the College, but in a really difficult case assistance is given to any medical man who may apply. While the preparation of antitoxic serum was undertaken for the Fellows of the College, any supply beyond that required by them will be available for other members of the profession.

A REPUTED MALAGASY MONKEY.

BY far the most important zoological event of the year, so far as mammals are concerned, is the discovery in the superficial deposits of Madagascar of certain remains of an extinct monkey-like animal. Of these remains—which include the imperfect front portion of a skull, and a considerable part of the lower jaw—an illustrated preliminary notice by Dr. C. J. Forsyth Major appears in the October number of the *Geological Magazine*. And although the author of that paper may modify some of his conclusions in a later and fuller communication, the discovery is too important to be passed over without mention in this journal.

The title of the paper—"Fossil Monkeys from Madagascar"—suggests the impression that all the conclusions and theories that have been published in regard to the origin of the Malagasy fauna will have to be amended or swept away. But a study of the figures and description of the specimen will show that this by no means follows. Without entering into structural details, it may be mentioned that the skull—so far as its imperfect condition admits of forming a conclusion—conforms in general features with the Anthropoid, as distinct from the Lemuroid, type; while the molar teeth are also monkey-like. In the upper jaw the dental formula is identical with that of the Neotropical *Cebidae*—that is to say, there are three premolars. In the lower jaw there is also a similarity between the *Cebidae*, the number of cheek-teeth being identical. But here the resemblance ceases, for the canine is absent, and its function is discharged by the anterior premolar, which is enlarged. In this respect, as in the number of cheek-teeth, the specimen resembles the typical *Lemuridae*; but the front teeth are different, and the premolars are unlike those of either lemurs or monkeys.

In describing the fossil—under the name of *Nesopithecus*—the author states that it indicates a distinct family of the Anthropeidae, "intermediate in some respects between the South American *Cebidae* and the Old World *Cercopithecidæ*, besides presenting characters of its own." He adds that the following general conclusions are suggested by the discovery: "(1) We may look forward in Continental Africa likewise for the discovery of Tertiary monkeys intermediate between *Cebidae* and *Cercopithecidæ*. (2) The recent African *Cercopithecidæ* are not invaders from the north-east, as has been supposed; on the contrary, most, if not all, of the Tertiary monkeys of Europe and Asia are derived from the Ethiopian region. The home of a part, at least, of the Anthropeidae seems to have been in the southern hemisphere. This assumption is corroborated by the two facts—that Anthropeidae make their appearance suddenly for the first time in the later Tertiary of Europe and Asia, and that they are entirely absent from the Tertiary of North America."

To properly criticise these conclusions would require much more space than is allowed by the editor. It may be conceded, in the first place, that the specimen undoubtedly indicates a distinct family; whether, however, it is an Anthropoid, appears much more doubtful. The presence of a functional lower canine is so constant in that group, that I think it may be taken as a subordinal character. And in any case the functional disappearance of that tooth indicates that *Nesopithecus* is not an ancestral type of the existing Anthropoids. Whether the transference of the functions of the canine to the anterior premolar indicates any affinity with the Lemuroids, or is merely a case of parallelism, I am not prepared to say. But it does seem probable that the fossil is an offshoot from the original stock

which connected the monkeys with the lemurs. And, so far as it goes, it tends to discountenance the view that the *Cebidae* are not genetically connected with the old-world monkeys.

With regard to the other conclusions of Dr. Major, I believe there is good evidence of the occurrence of fossil monkeys in the French Phosphorites (although this has never been published); and it hence appears probable that the ancestors of *Nesopithecus* may have reached Ethiopia with the other progenitors of the Malagasy fauna. I would further hazard the suggestion that the ancestral South American *Cebidae* likewise reached Ethiopia at the same time, and that they migrated to South America in the manner I have suggested in my recent volume on the Geography of Mammals for the Santa Crucian Ungulates. The supposition of Dr. Major that "most, if not all, of the Tertiary monkeys of Europe and Asia are derived from the Ethiopian region," does not appear to have sufficient evidence for its support. And if it were admitted, we should have to account for the absence of true monkeys in Madagascar. Probably the *Cercopithecidæ* and *Simiidæ* reached Ethiopia with its antelopes and zebras. Hence there seems no reason, at present, for modifying our conclusions as to the origin of the Malagasy fauna.

As it is a somewhat important matter, I may take this opportunity of asking—should this meet his eye—the German Professor who some years ago showed me at the British Museum some monkey-like molar teeth from the French Phosphorites, if he would either describe his specimens or communicate with me.

R. LYDEKKER.

MICROSCOPIC MARINE ORGANISMS IN THE SERVICE OF HYDROGRAPHY.

IT has for a long time been known that the sea abounds in microscopic organisms, both animal and vegetable. Among the former are entomostraca, infusoria, radiolarians, foraminifera, as well as larvæ of mollusca, radiates, and bryozoa. Among the plant-life the mass consists of diatoms, cilioflagellates, flagellates, and certain unicellular chlorophyllaceous algæ. For these pelagic forms Prof. Hensen has proposed the name *plankton*, which has been universally accepted.

Some years ago I examined the samples of vegetable plankton collected by the Swedish Arctic expeditions, as well as samples from various parts of the tropical seas, and I became convinced that certain parts of the oceans are characterised by different species. In the year 1893 I spent the summer at the west coast of Sweden, where I had the opportunity of examining the plankton at the marine biological station of Christineberg, that is to say in a fjord (loch) called Gullmarsfjord. I found that in the month of June the plankton consisted mainly of cilioflagellates, *Ceratium tripos* being the most common. During the last days of the month, however, the plankton changed. The water was from that time very rich in entomostraca, and the cilioflagellates became less abundant. At the same time the mackerel appeared in the fjord. All my samples had been collected at the mouth of the fjord, where the water is not very deep. In the interior the fjord becomes deeper, as is the case also with the Scotch lochs, and I now wished to know the character of the plankton at different depths. What I hitherto had examined was the plankton of the current, called by the Swedish hydrographers the Baltic current, which in the spring and summer runs along the Scandinavian coast up to Bergen, in Norway. Below that surface current there exists, according to the Swedish hydrographers, water with lower temperature and greater salinity. In company with Prof. G. Théel, and with the aid of his net, which could be closed and opened below the water, I made in July an attempt to get plankton from different depths of the fjord. We found in the cold bottom water very little plankton, some few specimens of a large *Sagitta* and of *Calanus finmarchicus* only. At about 30-40 metres the cilioflagellates (among them *Ceratium divergens*) were abundant, and on the surface the entomostraca. This examination was repeated during the first days of August, when I and Dr. Aurivillius had the opportunity of accompanying Prof. S. A. Pettersson and Mr. G. Ekman on the hydrographical expedition which went out at the time. The result was the same as before, but from the determination of the temperature and the salinity of the water it became clear that the plankton had been collected in water differing in those